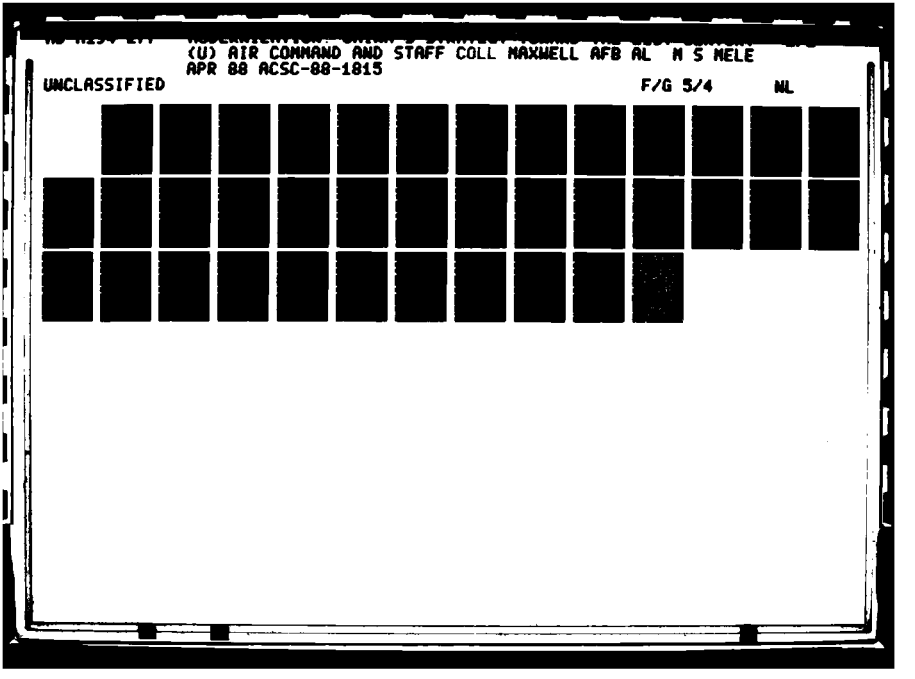
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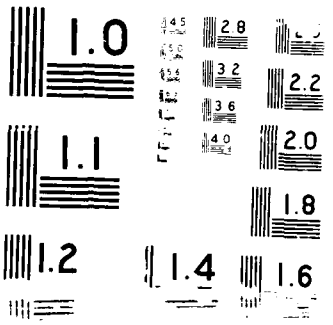
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STUDENT REPORT

MODERNIZATION: China's Strategy Toward the 21st Century

Major Michael S. Mele, USAF 88-1815

"insights into tomorrow"

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The Chinese leadership in 1978, as a consequence of the Cultural Revolution, outlined a modernization strategy to initially feed its ever-increasing population, and subsequently to develop China's industrial capabilities. The ultimate goal of this modernization was to join the ranks of the developed nations by the middle of the next century. This paper will assess the success of the modernization strategy and the challenges China will present to the United States as she joins the industrialized ranks.

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PREFACE

This is an unclassified research paper which will assess China's past, current and future modernization efforts. This paper was written under the auspices of the United States Air Force, Air Force Intelligence Service (AFIS), and is offered to AFIS for further publication.

I wish to acknowledge the following individuals and organizations for their valuable contribution to this paper, for without their assistance I could not have completed this project:

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This material is being submitted to the faculty of the University of Maryland, College Park, in partial fulfillment of the requirements for my doctorate degree (transfer credit).

ABOUT THE AUTHOR

Major Michael S Mele, USAF, (36), the son of Miriam and Ralph Mele, was born in New York City and grew up on Long Island, New York. He earned his Baccalaureate in Politics at Fordham University (New York) in 1974, and was commissioned through the Reserve Officer Training Corps. He attended Undergraduate Pilot Training at Fort Rucker, AL, and earned his wings in 1976.

Major Mele's operational flying experience includes helicopter missile support, combat search and rescue (37th Aerospace Rescue and Recovery Squadron, Little Rock AFB, AR), and special air missions (1st Helicopter Squadron, 89th Military Airlift Wing, Andrews AFB, MD).

Major Mele completed the Armed Forces Intelligence Course, at Lowry AFB in 1983 as a Distinguished Graduate. Subsequently, he was assigned to the 6th Tactical Intelligence Group Osan AB, Korea. As Chief, Military Analysis Branch, he was responsible for the North Korean and Soviet Far East Military District aviation problems, as well as the North Korean political-military situation.

In 1984, Major Mele was assigned to the Air Force Intelligence Service, Pentagon, Washington DC. As the principal threat and technical analyst for Chinese aircraft and missile systems, Major Mele was responsible for closely following Chinese defense modernization programs; especially the western upgrades of the A-5M, F-7M and F-8II fighters. Major Mele was also the principal threat and technical analyst for Soviet helicopter and Free World aerodynamic systems.

Major Mele has completed Squadron Officers School in residence, and Air Command and Staff College by seminar. In addition to his Bachelor of Arts, he has completed a Masters of Arts in Public Administration from Webster University, and is currently pursuing a Doctorate in International Relations (Northeast Asian Security Affairs) from the University of Maryland, College Park, MD.

Major Mele is married to Kathleen Frederickson-Mele.

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EXECUTIVE SUMMARY

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REPORT NUMBER 88-1815

AUTHOR(S) MICHAEL S. MELE, Major, USAF

TITLE MODERNIZATION: China's Strategy Toward the 21st Century

The Chinese leadership in 1978, as a consequence of the Cultural Revolution, outlined a modernization strategy to initially feed its ever-increasing population, and subsequently to develop China's industrial capabilities. The ultimate goal of this modernization was to join the ranks of the developed nations by the middle of the next century. What are challenges China will present to the United States as she joins the industrialized ranks?

China has, to date, been successful in her modernization. Agricultural modernization is now considered nearly complete, with further modernization through biotechnology. Concurrently, China has been modernizing her industrial base, and supporting this effort are the two subordinate modernizations of science and technology and defense.

Industrial modernization has centered on the basic industries, with modernization investment increases of 400%. While these and additional increases will bring China's 1950s-vintage industry up to date, science and technology modernization will provide for the future.

Science and technology modernization, an information exchange between China and western nations, has been concerned with agricultural and basic industry modernization. But more importantly, high technology agreements have been negotiated. Significantly, however, China's principal trading partner, Japan, has consistently refused to negotiate high technology information exchanges. This refusal should affect China's ultimate modernization model.

Also in support of China's industrial modernization is her defense modernization. China is modernizing to a level ten years obsolete to the state-of-the-art technology. This allows China to modernize her military at a significantly less expensive level, and still gain 20 years over her current military technology. Additionally, defense modernization also provides a source of hard currency which, in turn, is available for further industrial modernization. While this less than state-of-the-art military technology will mitigate against an expansionist future, as China will still face a vastly superior Soviet Union, it should help maintain the current geopolitical status quo in Asia.

To date China has been successful, initially importing entire industrial plants. This strategy, however, locked China into the technology of each imported plant. To transcend this problem, China began to negotiate joint-ventures in 1985 in which technology innovation was incorporated into the production mode. By far, most of this trade has been with Japan. But without access to Japan's state-of-the-art technology China should develop as the other newly industrialized countries in Asia, indigenously developing exported Japanese technologies. Developing along this model, with nearly unlimited human and natural resources, China should become a major economic power, third only to the United States and Japan. China's challenge in the next century, then, will be her economic power, and the United States will face yet another Asian competitor.

Introduction

Since the death of Mao Zedung and the rise of Deng Xiaoping, modernization in China has been the paramount policy goal. As a result of the isolation caused by the politically self-defeating Cultural Revolution, China was virtually cut off from the scientific and technical developments of the 1960s, 70s, and 80s. While the Cultural Revolution only lasted from the late sixties through the mid-seventies, it limited China's technological development to the 1950s. At the Third Session of the 11th Central Committee, in 1978, Deng and his followers instituted a modernization policy which would have China attain developed nation status by the beginning of the next century (35:23). Dr. Raymond F. Wylie, of Lehigh University, described this decision:

> "In the wake of Mao Tse-tung's death and the purge of the 'Gang of Four' radical leaders in 1976, a new campaign was launched to achieve what was termed the 'four modernizations.' It was hoped that a concerted effort for the remainder of the century will bring about major advances in agriculture, industry, defense, and science and technology, at which time China will join the ranks of the world's developed societies." (2:105)

In order for China to "join the ranks" China's future depends upon the long term success of this "four modernizations" strategy. Today's leadership is convinced of their ultimate success. In his report to the 13th National Peoples Congress (NPC), on 25 October 1987, the new General Secretary, Zhao Ziyang, declared this inevitability:

> "During these nine years [of the modernization policy] the gross national product, state revenues and the average income of both urban and rural residents have all approximately doubled. Therefore, we are fully assured that by the end of this century we will attain the objective of economic development set by the 12th National Congress." (35:23)

This paper, then, will address in detail the Chinese modernization strategies, and assess the possibilities of their successful implementation. By reviewing the past and current efforts at modernization; the strategy pursued to insure China's access to the vital western technology; and establishing the areas of emphasis, levels of technology imported and the technological assistance received; the capabilities of this modernized China can be roughly projected. With this projection, the more important

question of the challenge this 21st century China will pose to the United States can be addressed. Lastly, I will briefly assess the political problems which remain in the way of China's journey toward the 21 Century.

CHAPTER 1

THE FIRST MODERNIZATION

Population and Agriculture

China's future development is centered around Deng Xaoping's "Four Modernizations: agriculture, industry, science and technology, and defense. I order these four modernizations according to Deng's own priority, as it reflected his view of China's priorities for the beginning of the next century. Therefore; we begin at the beginning, population and agriculture.

Currently, China's population has reached just over one billion people. The latest World Bank estimate has placed the population at 1,029,000,000 individuals (37:228). By 1990, the end of the seventh 5-year plan, the population is expected to grow by an additional 79,000,000 people; and China is projected to enter the next century with 1,245,000,000 mouths to feed. This fact is the single, overriding imperative in deciding how and in what areas China will modernize. Thus, agriculture was the first and the most important area for modernization.

China's agricultural modernization has, in reality, been a large step back to the family plot and market forces (38:--). By allowing these two liberalizations China has been able to increase their crop harvest and reduce their grain imports by $500,000 a year since 1983.

TABLE 1

CHINESE GRAIN PRODUCTION (27:143)

10,000 Tons

1979: 33,212	1983: 38,728
1980: 32,056	1984: 40,731
1981: 32,502	1985: 37,911*
1982: 35,450	1986: not available

* 1985 decrease due to weather.

TABLE 2

CHINESE IMPORTS: Cereals and Cereal Preparations (17:--)

1983:	$2,010,700
1984:	1,519,300
1985:	1,050,000

This agricultural performance reflects the 8% annual production rate set in the sixth 5-year plan (1980-85). The actual growth rate surpassed that goal by half. As announced by the China State Statistical Bureau:

> "During the 8 years between 1978 and 1986 the average annual growth rate of the rural economy was 13.2 percent." (31:34)

While China will probably always import some basic foodstuffs, basic grain product imports will continue to decrease during the next 5-year plan. However, this reduction will be at a slower rate since the agricultural production target, in the seventh 5-year plan, was placed at only 4% (one-half of the previous plan's annual target) (7:15).

But while the agricultural modernization has been successful, there are still problems. As Zhao reported to the 13th NPC:

> "The overwhelming majority of our one billion people have secured a life with enough food and clothing. People in some areas are beginning to become well-off. There are still certain areas where the problem of food and clothing has not yet been solved, but even in those places there has been some improvement."
> (35:23)

While further improvement in agriculture is necessary, this improvement, and the improvement in clothing, will come from the principal modernizations; industry, science and technology, and defense.

CHAPTER 2

THE PRINCIPAL MODERNIZATIONS

Industry, Science and Technology, and Defense

While the agricultural modernization was the initial modernization, and the one which answers the overriding imperative of feeding both present day and a modernized China; the industrial, scientific-technological and defense modernizations will bring China into the 21st Century.

Significantly the previous priority order of agriculture, industry, science and technology, and defense has now been altered. The leadership is now calling for a gradual modernization of industry (first), with a continuation of the successful agricultural modernization (second) (35:27). Defense and science and technology are still considered modernizations in there own right, but from Zhao's report, they now represent supporting modernizations in the overall scheme. Additionally, the leadership now realizes the previous plan of modernization by 2000 was much too optimistic, and now places the date for a modern China beyond 2050.

> "It will be at least 100 years from the 1950s... to the time when socialist modernization will have been in the main accomplished..." (35:27)

Zhao's benchmark of the 1950s probably represents a more accurate assessment of China's present technological development, and the extra 50 years reflect a basic reassessment of the problems ahead in transforming China into a developed nation. What are the strategies pursued for each modernization, and who is providing the modernization assistance are questions which will provide the necessary information to answer the larger question of China's ultimate success in attaining developed nation status by the middle of the next century.

INDUSTRY

When one speaks of industrial modernization in China, one must look first at the industrial infrastructure. That infrastructure, transportation and electrical power generation, is the key to further modernization.

Returning to agricultural modernization, one serious impediment to Chinese agricultural modernization has been the lack of a modern transportation infrastructure. (38:--) It is

in this area, and energy production, that China is focusing its initial industrial modernization.

If one reviews the sixth (1981-85) and seventh (1986-90) 5-year plans, those dedicated to modernization, one views the modernization strategy out to 1990. One striking point is the heavy investment in transportation and energy production.

To improve the transportation infrastructure the Chinese government has invested 12% of the total funds available for the sixth 5-year plan (1:188). The government plans to invest 25% of the seventh 5-year plan's funds ($133.75 billion) (25:28).

China's energy production modernization expenditures are an even higher priority. In the sixth 5-year plan, the Chinese dedicated 25% of the available funds to energy modernization. This percentage figure doubled in the current plan. The Chinese plan to invest $267.5 billion before 1990 to improve both the energy production and transportation industries (25:28).

We have seen a corresponding increase in electrical machinery and transportation import activity. Both categories have experienced a geometrical increase in value since 1983.

TABLE 3

CHINESE IMPORTS: Machinery and Equipment (17:--)

(US$)

	1983	1984	1985
Electrical machinery:	1,188,300	2,424,100	4,714,700
Transport equipment:	1,207,100	2,197,700	4,835,700

These categories together represent 24% of the total imports in 1985. No other two categories of the 63 standard commodity classes were so significant. However, modernization investment in other industrial areas has also been significant.

TABLE 4

Investment in Technical Updating and Transformation

(Rmb 100 mil)

	1981	1982	1983	1984	1985	%Δ 81/85
Machine building:	23.57	29.02	36.29	48.42	33.91	+70%
Textiles:	20.05	23.41	30.78	26.97	33.23	+60%
Metallurgy:	18.66	19.99	25.04	34.41	45.45	+254%
Chemicals:	17.16	20.93	27.04	31.72	26.60	+65%

(81-83/26:--)
(84-85/27:--)

Clearly, energy production and transportation are areas of emphasis for the Chinese modernization, but other industrial modernization areas are still important. While these industrial reforms address modernization in the near term, to look beyond into the next century one must turn to the third area of modernization, science and technology.

SCIENCE AND TECHNOLOGY

The science and technology (S&T) modernization addresses the basic sciences, both now and what is expected in the future. This modernization is both an answer to today's problems, and an investment in China's future. From Zhao's report:

> "The primary objective of scientific and technological work is to revitalize the economy. Emphasis should be placed on modernizing the technology and equipment of industries devoted to large-scale production, so as to achieve a marked improvement in the technology of the principal sectors of agriculture and of such key industries as energy, raw and semi-finished materials, transport, communications and machine building... At the same time, qualified personnel should be organized without delay to start research and development in high technology, especially in the fields of microelectronics, information, bioengineering and new materials, and further efforts should be made to strengthen basis research and develop soft science."
> (35:29-30)

Because this type of modernization is primarily an academic information exchange, the most profitable means of analysis is to look to the formal agreements China has signed for scientific and technological cooperation.

State Counselor Song Jian, Minister of the State Scientific and Technological Commission, recently outlined the extent of the Chinese S&T cooperation program.

> "China has already established relations of scientific and technological cooperation and exchanges with 106 countries and concluded intergovernmental agreements on scientific and technological cooperation with 50 countries and participated in 250 international scientific and technological organizations. (23:16)

While the program statistics are impressive they represent all of China's exchange programs, including those with countries less developed than China. For this analysis, we will look at China's agreements with her principal modernization trading partners: Japan, the United States and Western Europe.

Reviewing the formal protocols China has signed with her principal trading partners reveals the continued acknowledgement of the overriding imperative of caring for the population, both now and in the next century. Out of the 22 agreements signed with the United States since 1979, fully one-half deal with food production and environmental/health issues (see Table 5). The industrial modernization priority is represented with eight agreements (five high technology science protocols and three basic industries protocols). Program management agreements make up the remaining U.S. protocols.

China's European trading partners also follow this pattern of an information exchange strategy. Agreements with West Germany include construction and environmental protection (32:9); and Italian agreements cover biotechnology, energy, agriculture, health, food and nutrition, communications and information (33:3). What is interesting is China's principal trading partner, Japan, is prominently absent. Aside from not sharing their research technology, Japan apparently is not interested in projects which are Chinese modernization priorities. Zhu Lilan, Vice Minister of the State Scientific and Technological Commission, explains this impasse:

> "As far as Sino-Japanese scientific and technological cooperation is concerned, I think more government efforts have to be made in order to achieve further progress in this cooperation...It is hoped that our two countries will make further efforts to strengthen the scientific and technological cooperation between the two countries. But there is another problem, that is, if one country is interested in one project, and the other not. In such a case, the former simply cannot coerce the latter into cooperation." (23:19)

While Japan is China's principal trading partner, she apparently does not export her state-of-the-art technology. This policy assures Japan's prominence in leading-edge technologies, but denies China (as well as other Asian developing nations) access to the latest technological concepts. As we shall see, this policy will significantly impact China's modernization.

As can be seen from Table 5, the S&T modernization is primarily supportive in nature, and is primarily concerned with feeding the enormous population that is China today, and will be China in the next century. Moreover, S&T modernization provides a basis for China's industrial expansion in the next century.

Each of these modernizations are primarily internal in nature and do not directly challenge the international order. The last area of modernization, defense, would be the only area of possible concern to the international community, if it were not for Chinese statements on defense modernization.

TABLE 5

CHINA: U.S. Science and Technology Protocols (18:50)

General/Management:	3	Basic Agreement Student Exchange S&T Management
Basic Industries:	3	Metallurgy Hydroelectric Power Transportation
High Technologies:	5	Space Technology High Energy Physics Basic Sciences Aeronautical Science and Technology Nuclear Physics/Controlled Magnetic Fusion Research
Food Production, Environmental and Health:	11	Agricultural Exchange Marine and Fishery Atmospheric Sciences Hydrology Earth Sciences Environmental Protection Earthquake Studies Urban Planning Public Health Biomedical Sciences Nuclear Safety Matters

DEFENSE

At the conclusion of the 13th NPC, General Secretary Zhao discussed defense modernization with the press:

"We are going to strengthen our national defense. However, we are not going to increase our military expenditure...the progress of China's modernization of national defense is mainly expressed in its quality; it needs to be built up with our economic strength and scientific and technological progress." (24:39-40)

Previous to this, during the August 1983 visit of Representative Melvin Price, the then Chairman of the House Armed Services Committee, Chinese State Counselor Ji Ping-fei claimed that China did not seek the most advanced military technology available, but rather sought an intermediate level of technology (19:8-13). Viewing the principal military imports, these statements appear correct.

China has three direct aircraft modernization programs and one indirect program ongoing: the A-5M, the F-7 (twice), and the F-8II. In each program China has agreed to acquire 1970s avionic technologies, as outlined in Table 6.

While this decision would appear short sighted, China is realizing its own technological limitations. China's current military equipment has a 1950s technological level (vacuum tubes). A jump to 1970s technology (transistors) is hard enough without attempting to leap to the integrated circuit technologies of the 1980s. Nevertheless, China is still receiving technology which is twenty years beyond anything it currently possesses. Additionally, in accepting this "intermediate" technological level China also supports, again, the non-defense modernizations which have come before.

Geopolitically, China is protecting the regional stability which is vitally necessary for her modernization effort. By modernizing the military to a level which is obsolete to the Soviet Union, but maintains a rough equivalence with India and ensures continued superiority over Vietnam, China can counterbalance her Asian competitors and maintain regional stability. Again, from Zhao's report:

"The current international situation is favorable to our socialist modernization. Propelled by the tremendous efforts of the world's people [*read: China's people*] to safeguard peace and pursue development, there is an increasingly strong demand for an end to the arms race and aggression and expansion, and for genuine disarmament and early settlement of regional conflicts." (35:49)

These demands are veiled references to present unilateral reduction of Peoples Liberation Army by 1 million troops (24:39), and China's position on the regional conflicts of Afghanistan and Cambodia. If carried through to fruition, these demands would maintain the relative status-quo thus protecting China's modernization. Additionally, by acquiring basically obsolete military technology, China also safeguards her modernization capital.

Acquiring 1970s technology is also significantly less expensive than the current state-of-the-art. By purchasing this "intermediate" level of technology, China attains its military modernization goals without jeopardizing the funds necessary for the other modernizations. Additionally beyond consuming funds, the defense modernization is a potential source of hard currency foreign reserves. Currently, International Defense Review has reported China as the fifth largest arms exporter. Customers are less developed countries who also desire less complicated "intermediate" technology.

> "Customers have included Egypt, Pakistan, Iran and Iraq, as well as numerous African countries. Brazil and Thailand are the most recent buyers...Brazil is currently negotiating the purchase of China's F-7M... in what may turn out to be its largest aircraft sale to date. The aircraft has previously been exported to Zimbabwe and Tanzania. F-7s are also reportedly in use by both Gulf War beligerents..." (10:857)

To gain an understanding of earnings potential of China's arms trade, we can look to one of the parent industries, aviation. China's aviation exports have 'taken-off', generating $18 million in the first half of 1987. This is significantly higher, by 460%, over the same period in 1986. The total 1987 earnings are expected to reach $35 million (20:15). Aircraft production includes the McDonnell Douglas MD-82 (assembly), the West German MPC-75 advanced technology transport (assembly), and the Aerospatiale Dauphine 2 helicopter (fabrication and production) (5:17). China's modernized F-7M and A-5M fighter aircraft are also available for sale. As the recent Persian Gulf "Silkworm" cruise missile appearances illustrate, China's arms trade is expanding and should provide a valuable source of hard currency earnings to support the overall modernization effort.

TABLE 6

CHINA: Aircraft Modernizations, by Participating Countries

Aircraft:	A-5M
Country:	Italy
Upgrade:	ranging radar, inertial navigation, heads-up display, air data computer, data bus controller (9:26)
Aircraft:	F-7M
Country:	United Kingdom
Upgrade:	ranging radar, air data computer, heads-up display, VHF/UHF communications, power supply systems (11:1166)
Aircraft:	F-7M
Country:	Pakistan (United States)
Upgrade:	airframe modifications to accommodate a multi-mode radar, new engine, avionic displays and avionics. (4:34)

Note: the Pakistani F-7M modernization is at the feasibility study stage. Grumman Corp. has completed the study and confirmed the compatibility of the F-7 and the projected U.S. systems. Chinese access to this technology should not be ruled out (4:34).

Aircraft:	F-8II
Country:	United States
Upgrade:	air intercept radar, inertial navigation, heads-up display, mission and air data computers, and a data bus. (3:99-101)

To this point I have discussed the industrial, agricultural, S&T, and defense modernization strategies. But the modernization strategies only address half of the question. As important as the "what" to be modernized is, the "by whom" and "how" will clarify China's chances for success in its trek toward the next century.

CHAPTER 3

CHINA'S SUCCESS TO DATE

To this point I have addressed the modernization priorities with category import percentages, but this method only addresses half of the problem. Noting from "whom" and "how" China imports technology will also help to clarify China's modernization success and her position in the next century. If China is importing from one principal country, then the production strategies and management techniques will probably carry through to the Chinese. The trade relationships will also tend to color China's global outlook and behavior. Professor Schandler has recognized the country which will primarily effect China's future modernization.

> "More than any other nation, Japan has assumed a critical role in China's drive for economic modernization. Japan is the primary external actor providing the economic and technological stimulus for the development of China. Over the long run, Japan may be more important to China than the United States if China is to build the modern industrial base so ardently desired by Deng Xiaoping and the other modernizers. In time, deeper political consequences could flow from this developing relationship." (15:72)

While Professor Schandler does not bring this observation any further in this context, he has touched upon a central point in China's future development. This can be seen in Tables 7 and 8. Japan, from 1979 to 1983 has received just less than half of the total value of China's principal import activity. The United States, for the same period, received only about a third. Beginning in 1984, Japan received over 50% of the trade value, while the U.S. portion reduced to about a quarter of the value (see Table 8).

From this it can clearly be seen that Japan is China's principal trading partner. But the "who" is only part of the equation, the "how" of the modernization strategy is probably more important. Reviewing the import trade mechanisms will reveal "how" China is receiving her modernization technology.

China has used a number of trade mechanisms to gain foreign technology. Initially, under the Japan-China Long-Term Trade Protocol (1978), China imported complete plants, technologies and engineering materials (12:7). But importing whole

TABLE 7

CHINA: Value of Imports
Principal Trading Partners

US$10,000

YEAR	Japan	USA	Germany	France	Britain	USSR
1979	394,404	185,659	173,940	40,620	50,115	25,039
1980	516,891	383,021	133,282	31,469	54,000	26,412
1981	538,088	483,253	153,937	36,490	30,682	10,842
1982	390,014	371,675	120,632	23,089	46,798	13,701
1983	462,045	232,167	129,964	53,180	104,011	34,571
1984	737,360	366,338	150,843	31,334	72,889	56,768
1985	1,082,529	437,336	239,416	59,191	97,544	91,303
1986	final statistics currently not available.					
1987*	531,159	217,867	168,696	52,744	43,902	57,702

* January to July 1987, preliminary statistics

(79-83/28:840-878)
(84-85/29:961-965)
(87/21:13-14)

NOTES:
1. For brevity, only China's principal trading partners (import value over $20 million) are shown
2. Hong Kong trade statistics are not included because the data reflects the colony's "re-export" activities in which third-party trade is funneled into China. If included, Hong Kong's value would fall between Japan and the United States.
3. The Soviet Union is shown for analysis later in this paper.

TABLE 8*

CHINA: Value of Imports (Percentage Breakdown)

US$10,000

YEAR	Total Value (principal partners)	Percentage Breakdown Japan	US
1979	869,777	45	21
1980	1,145,075	45	34
1981	1,253,292	43	38
1982	965,909	41	39
1983	1,015,938	46	23
1984	1,415,532	52	26
1985	2,007,319	54	22
1986	final statistics currently not available.		
1987**	1,072,070	50	20

* Table 8 based on Table 7 statistics
** Jan - Jul 1987, preliminary statistics

production plants or producing under licence does not necessarily transfer the technological know-how behind the process. Under these conditions China is forced into a "reverse engineering" exercise to establish the technologies involved, as they have done with their copy of the French "Super Frelon" helicopter (11:1187).

In order to transcend the current modernization program, China must "import" the technology behind the imports. This can only be done through the joint-venture agreement, in which product improvement and technological innovation are incorporated into Chinese production. This mechanism has not been used extensively in the past as only 6,914 joint ventures have been consummated since 1978 (34:4), or an average of about 760 a year. Considering a total average import value of $9.39 billion (computed from Table 7) from Japan and the US alone, this mechanism has not been used extensively. But the situation began to improve significantly in 1985, with the initiation of 1,412 joint ventures, of which 54 would be considered high technology ventures (computers, electronics, etc) (30:1215).

The limited joint venture statistics is not a problem in which China bears full responsibility. The lack of joint ventures stems from a larger export embargo enforced upon China by its trading partners through the Coordinating Committee for Multi-Lateral Security Export Controls (COCOM). COCOM is an organization of developed nations, Japan and the North Atlantic Treaty Organization (NATO) nations (excluding Iceland) which monitor and approve the type and amount of technology which is exported to the communist bloc, China included. These are also the nations from which China must receive its modernizing technology. Hence, COCOM is an impediment to China's development.

The Chinese view COCOM as a conspiracy, on the part of the developed nations, to deny China the technology necessary to modernize.

> "COCOM was originally an international secret embargo organization which the United States formed in 1947 in coordination with NATO countries and Japan on the pretext of 'common security.' It was directed against Eastern countries, especially China. However, given the tremendous changes in international relations since World War II, COCOM's 'embargo' has become increasingly out of keeping with the development of the times." (22:7)

Removing China completely from the COCOM restrictions, in the Chinese leadership's view, is the only course for the COCOM nations to follow.

> "It is high time that China was completely removed from the strategic export embargo list of the Coordinating Committee for Export Control (COCOM)!" (22:7)

Whether it is time or not, the COCOM nations have not moved toward removing China from the embargo list. This is due to the internal politics of COCOM, and not necessarily because of any future threat from China. COCOM is currently divided on the China question. The United States, supported by Britain, is pressing for high technology and military sales to China; while France and Germany are reticent out of fear of offending the Soviet Union, and thus, jeopardizing their larger Soviet market (6:24-25). It is ironic one of China's lowest trading partners, by value (Table 7), has such a large influence on her COCOM trade; especially since the Soviet Union is the principal target of COCOM, rather than a member.

However, the COCOM nations under American leadership have taken action to facilitate trade with China. In 1983, the United States designated China a "Control Group V" country. This action recognized China as a friendly but still non-allied nation; and allowed the 1984 volume of exports to increase dramatically, especially in the electronic and computer technology fields (16:--)

TABLE 9

U.S. Export Licenses Approved for China (16:--)

Year	Applications
1982	2,020
1983	2,834
1984	4,443
1985	8,637

In 1985, COCOM streamlined the approval mechanism for China export cases. The reform established a "green zone" of 27 commodities which no longer require COCOM approval. Essentially, an export company based in a COCOM nation could now export controlled items if the company's host nation approved the export. The additional COCOM approval was no longer required. This reduced to almost nothing the time required for export review. Previously, the review process could delay transactions for up to 9 months (14:53).

However, national security concerns still color the COCOM process. Nuclear weapons and delivery systems, intelligence gathering, electronic warfare, anti-submarine warfare and air superiority technologies are still embargoed (14:53). Despite the COCOM compromises, Zhao Ziyang continues to press for unrestricted trade, and he ties this unrestricted trade to the joint venture and modernization in general. During the 13th NPC, Zhao outlined the issue:

> "The present world is an open one. We have achieved great success in pursuing the fundamental state policy of opening to the outside world. In [the] future we should enter the world economic arena more boldly, decide on correct strategies for export and import and for the use of foreign funds, and expand trade and our economic and technological co-operation with other countries...so as to create more favorable conditions for accelerating progress and for improving economic results." (35:32)

It remains to be seen if China can overcome COCOM's insistance on export controls, but China has been at least partially successful in her initial modernization strategies. From the preceeding we can tentatively speculate on the position China should occupy at the middle of the next century. We will accomplish this by estimating China's gross capabilities based on her success to date.

CHAPTER 4

Modernization: an Estimate, its Implications and Problems

If China continues her modernization by joint-venture, and if her trading partners decide to allow a free technology flow, what then will be China's position in the middle of the next century? By reviewing the industries China has concentrated on modernizing, and linking this investment with her S&T protocols, we can extrapolate to gain an estimate of China's future strengths. With that in hand, we can then address the Chinese challenges the United States will face in the 21st Century. Finally, we will assess what non-industrial problems remain to effect the ultimate outcome. But before we address challenges and outcomes, we must revisit the population issue.

This paper began with a review of the population problem which will place China, by the end of this century, at almost 1.25 billion strong. By 2050, the end of Zhao's modernization program, China will add an additional 200 million to her population (1.4 billion in total) (36:192). This vast manpower pool has historically been wasted through famine and disease, but the leadership plans to turn this human problem into human capital through education.

> "Education is of fundamental importance to the fulfillment of our great long-range mission. We must therefore continue to stress the strategic role of education and do a better job of tapping intellectual resources. As the economy develops, the state should increase year by year the funds allocated for education, while continuing to encourage people from all walks of life to raise money to set up new schools." (35:30)

For the first time in history, China presently has a basically well fed population; and this situation should improve with further agricultural modernization, mainly through imported biotechnology. As the situation improves, China will be able to take advantage of a nearly endless pool of properly well fed and educated workers. But in what industries will these workers be employed?

From China's past investments and imports, we can establish trends for China's future development. Previously, we have established energy and transportation as areas of immediate modernization emphasis. Both of these areas have whitnessed a 400% increase in import activity between 1983 and 1985 (Table 3). Additionally, the Chinese have increased the metallurgy updating investment by 244% (Table 4). China also

has signed protocols for the exchange of advanced technology information in these same areas. For energy generation, China's agreements cover hydroelectric power and controlled magnetic fusion physics. For transportation, the protocols address aeronautical science and space technology, and for metallurgy there is a basic metallurgy science protocol.

With these modernization emphases, and since Japan should have the principal impact on her development, China should develop along the previously successful "Tigers" model. The "Tigers" are the recently industrialized Asian nations, such as South Korea, Taiwan, and Singapore. These Tigers have had phenomenal success in rapid industrialization by concentrating on indigenous development of exported Japanese technologies. But in China's development there should be two significant and beneficial differences, energy reserves and population.

Unlike Japan or the other Tigers, China has access to its own energy reserves; coal, oil and natural gas. These reserves will allow China to be energy self-sufficient, negating the need to import energy and draining potential modernization capital. This self-sufficiency should also allow China to raise additional foreign reserves, through energy exports, to support the modernization effort.

As with energy reserves, China will have more than sufficient human reserves. While this was not a problem for Japan or the Tigers, the scope of this population differential should allow China to out produce most of its competitors. With the maturization of her transportation and communications infrastructure, China should be able to take advantage of her (by then) educated human capital turning what has historically been a problem into an advantage. By sheer numbers, properly trained and educated workers should make China's industrial production soar. In short; China has the potential to become, and in my opinion will become, a major economic power third only to the United States and Japan. This economic power will be China's challenge to the United States in the next century.

This economic challenge should not have a corresponding military challenge. For the geopolitical, technical and fiscal reasons outlined in Chapter 2, China will remain a regional power primarily concerned with its own sovereignty issues. (The desire for military adventure usually comes from excess capital or the need for resources. China does not enjoy the former situation, nor does she suffer from the latter.) This is not to say China will forgo advances in military modernization; but these advances should be designed to maintain the regional status-quo. China should not become a military threat to U.S. interests in the next century. And, as China becomes integrated deeper into the world economy, China will have a vested interest in global stability.

Besides, even a militarily modernized China will still be preoccupied with feeding its 1.4 billion citizens.

But before this modernization estimate is complete, two issues must be addressed; the reunification of Taiwan and the future of Party control in the economy. While these issues are not industrial in nature, they directly impact the eventual success of the modernization effort.

The first issue, Taiwan, is largely a demonstration of Chinese intransigence even when that intransigence is detrimental to her own development. China has, in the past, threatened her American trade relationship over U.S. trade, especially arms trade, to Taiwan. By allowing this sovereignty issue to interfere with one of the principal sources of her modernization technology, China is 'cutting off her nose to spite her face'.

China has had recent successes in its reunifications efforts. Both the British and the Portuguese have agreed to return Hong Kong and Macao respectively, and the Chinese leadership expects Taiwan to follow suit. From Zhao's report to the 13th NPC:

> "Let the Chinese people on the mainland unite still more closely with our compatriots in Hong Kong, Macao and Taiwan...under the great patriotic banner of reunifying the motherland and rejuvenating China." (35:49)

Unfortunately for China, Taiwan does not fit into the 'occupied territories' category. Taiwan has, in its own right, a modernized robust economy with a gross national product of $65 billion and foreign reserves of $74.1 billion (39:--). (As pointed out earlier, Taiwan is considered one of the Asian Tigers.) Taiwan maintains a military sufficient to deter a forced reuninfication, and she produces her own military equipment. In reality, there is little China can do to compel Taiwan's return; but, as Dr. Chun-tu Hsueh believes, while the sovereignty issue will probably not change, there may be room for an improvement in the bilateral relationships, and the possibility of some future political arrangement short of reunification.

> "Without a combination of other factors, Taiwan will not follow suit (return to China as Hong Kong), but the HK model will certainly greatly influence the mentality, outlook, and policy of the Taiwan authorities and the people on the island." (40:--)

It is in China's interest to not allow this issue to interrupt the flow of her modernization technologies; but as in past political campaigns, the Cultural Revolution in particular, China does not always pursue its own interests.

Aside from the Taiwan issue, the Chinese must resolve the political question inherent in modernization. Modernization, and its necessary liberalizations, will require a reduction in political control (ie: the Party) in order to make the advances planned. Professor Harding recognized this problem prior to the 13th NPC:

> "...the success of the urban economic reforms depends on difficult decisions in the political realm, particularly the problems of reducing the authority of both the Communist Party and the state over economic enterprises. So far, Chinese reformers have issued regulations and directives that order party secretaries and bureaucratic officials to relax control over enterprise managers. More drastic measures may be required, including reforming the system of ownership of state enterprises, restructuring the state bureaucracy responsible for economic affairs, and even abolishing the party committees within individual enterprises." (8:42)

Zhao, likewise, recognizes economic reforms are necessary. From his report to the 13th NPC:

> "The deepening of the ongoing reform of the economic structure makes reform of the political structure increasingly urgent...Without reform of the political structure, reform of the economic structure cannot succeed in the end." (35:37)

In specifically addressing enterprises, Zhao called for a reduction of direct party control.

> "In enterprises, Party organizations should supervise the work and ensure that it is accomplished. Instead of attempting to provide centralized leadership, they should support the directors and managers in their assumption of overall leadership." (35:38)

However, Zhao went to great lengths to reassure the Party it will remain in charge. China will not, despite any amount of Western wishful thinking, change its essential political system. China will remain socialist, with the Communist party in ultimate control of China.

> "The system of the people's congresses, the system of multi-party co-operation and political consultation under the leadership of the Communist Party, and the principle of democratic centralism are the characteristics and advantages of our system. We shall never abandon them and introduce a Western system..." (35:37)

In the end, it will be a political decision whether China completes its journey towards modernization. Oversensitivity to Taiwan sovereignty, and an unwillingness to relinquish party control could derail China's journey. Pragmatically, China must feed its future 1.4 billion people, and in order to do that China must modernize. But, as with the Cultural Revolution, politics in China are not always pragmatic.

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